WHAT IS CLAIMED IS:

1. An impact and torque absorbing prosthetic shock module comprising:

an outer pylon;

an inner pylon telescopingly engaged with said outer pylon so that an annular interface is formed between said pylons, said inner pylon adapted to move axially and rotationally with respect to said outer pylon;

a resilient element resisting relative axial displacement of said pylons; and

a torque-resisting cuff providing torsional resistance to relative rotational motion between said pylons.

2. A shock module according to Claim 1, wherein said resilient element comprises a coil spring.

3. A shock module according to Claim 2, wherein said spring is proximally attached to one of said pylons and distally attached to the other of said pylons.

4. A shock module according to Claim 2, wherein said resilient element further comprises a compressible fluid in combination with said coil spring.

5. A shock module according to Claim 1, wherein said resilient element comprises a compressible fluid.

6. A shock module according to Claim 5, further comprising a pressure controller configured to control the pressure of said fluid.

7. A shock module according to Claim 6, wherein said pressure controller comprises a valve in fluid communication with said fluid.

8. A shock module according to Claim 7, wherein said pressure controller further comprises a fluid pump in combination with said valve.

9. A shock module according to Claim 5, wherein said fluid is contained within a closed system inside of said shock module.

10. A shock module according to Claim 1, wherein said cuff is attached to said pylons in a manner preventing atmospheric particles from entering said annular interface.

11. A shock module according to Claim 1, wherein said cuff is configured to provide increasing torsion resistance as said inner pylon is rotationally displaced with respect to said outer pylon.

12. A shock module according to Claim 5, wherein said cuff is configured to provide increasing torsion resistance as the pressure of said fluid is increased.

13. A shock module according to Claim 1, wherein said cuff has a generally tubular shape and is proximally attached to an outer surface of one of said pylons and distally attached to an outer surface of the other of said pylons.

14. A shock module according to Claim 13, wherein said proximal and distal attachments of said cuff to said pylons are provided by ring clamps that clamp said cuff to said pylons and provide air tight seals with respect to the entire circumference of said pylons.

15. A shock module according to Claim 13, wherein said cuff comprises an inner layer formed from a resilient material and an outer layer formed from a fabric.

16. A shock module according to Claim 15, wherein said inner layer is formed from rubber.

17. A shock module according to Claim 15, wherein said outer layer is formed from nylon.

18. A shock module according to Claim 15, wherein said outer layer comprises fibers substantially oriented at a generally 45 degree angle from the longitudinal axes of said pylons.

19. A shock module according to Claim 1, adapted to be proximally attached to a stump-supporting socket or an intermediate prosthetic device.

20. A shock module according to Claim 1, adapted to be distally attached to a prosthetic foot.

21. The shock module of Claim 20 in combination with said prosthetic foot.

22. A shock module according to Claim 3, wherein said coil spring is free of pre-loading stress, so as to provide a smooth or non-jarring compression initiation and a smooth or non-jarring extension termination.

23. A shock module according to Claim 3, wherein said coil spring exhibits a displacement substantially linearly proportional to an applied compressive force.

24. An impact and torque absorbing prosthetic shock module comprising:

an elongated upper pylon;

an elongated lower pylon adapted to move axially and rotationally with respect to said upper pylon;

a resilient element resisting relative axial displacement of said pylons; and

a torque-resisting cuff providing torsional resistance to relative rotational motion between said pylons; wherein

the longitudinal axis of said upper pylon and the longitudinal axis of said lower pylon are maintained in a generally colinear alignment.

25. A shock module according to Claim 24, further comprising a guide pin fixed with respect to said lower pylon and telescopingly engaged with said upper pylon, said guide pin maintaining the longitudinal axis of said upper pylon and the longitudinal axis of said lower pylon in a generally colinear alignment.

26. A shock module according to Claim 24, wherein said resilient element comprises a coil spring.

27. A shock module according to Claim 26, wherein said spring is proximally attached to said upper pylon and distally attached to said lower pylon.

28. A shock module according to Claim 26, wherein said resilient element further comprises a compressible fluid.

29. A shock module according to Claim 24, wherein said resilient element comprises a compressible fluid.

30. A shock module according to Claim 29, further comprising a pressure controller adapted to control the pressure of said fluid.

31. A shock module according to Claim 30, wherein said pressure controller comprises a valve in fluid communication with said fluid.

32. A shock module according to Claim 31, wherein said pressure controller further comprises a fluid pump in combination with said valve.

33. A shock module according to Claim 29, wherein said fluid is contained within a closed system inside of said shock module.

34. A shock module according to Claim 24, wherein said cuff is configured to provide increasing torsion resistance as said upper pylon is rotationally displaced with respect to said inner pylon.

35. A shock module according to Claim 29, wherein said cuff is configured to provide increasing torsion resistance as the pressure of said fluid is increased.

36. A shock module according to Claim 24, wherein said cuff has a generally tubular shape and is proximally attached to said upper pylon and distally attached to said lower pylon.

37. A shock module according to Claim 36, wherein said proximal and distal attachments of said cuff to said pylons are provided by ring clamps that provide air-tight seals with respect to an entire circumference of said pylons.

38. A shock module according to Claim 36, wherein said cuff comprises an inner layer formed from a resilient material and an outer layer formed from a fabric.

39. A shock module according to Claim 38, wherein said inner layer is formed from rubber.

40. A shock module according to Claim 38, wherein said outer layer is formed from nylon.

41. A shock module according to Claim 24, adapted to be proximally attached to a stump-supporting socket or intermediate prosthetic device.

42. A shock module according to Claim 24, adapted to be distally attached to a prosthetic foot.

43. The shock module of Claim 42 in combination with said prosthetic foot.

44. A shock module according to Claim 26, wherein said coil spring is free of pre-loading stress, so as to provide a smooth or non-jarring compression initiation and a smooth or non-jarring extension termination.

45. A shock module according to Claim 26, wherein said coil spring exhibits a displacement substantially linearly proportional to an applied compressive force.

46. A shock absorbing prosthesis, comprising:

an upper support member;

a lower support member, said upper and lower support members being coaxially and slidably supported relative to one another; and

a flexible tubular member secured between said upper and lower support members so as to provide resistance to relative rotation between said upper and lower support members.

47. A shock absorbing prosthesis according to Claim 46, wherein said upper and lower support members are telescopingly engaged with one another.

48. A shock absorbing prosthesis according to Claim 46, further comprising a pin that maintains the longitudinal axes of said upper and lower support members in a generally colinear alignment.

49. A shock absorbing prosthesis according to Claim 46, wherein said tubular member comprises rubber.

50. A shock absorbing prosthesis according to Claim 49, wherein said tubular member comprises a rubber inner layer and an outer layer comprising fibers.

51. A shock absorbing prosthesis according to Claim 50, wherein said fibers are oriented at an angle within the range of 30 to 60 degrees from the longitudinal axes of said upper and lower support members.

52. A shock absorbing prosthesis according to Claim 51, wherein said fibers are oriented at a generally 45 degree angle from the longitudinal axes of said upper and lower support members.

53. A shock absorbing prosthesis according to Claim 46, including an air tight region inside of said tubular member, said air tight region enclosing a compressible fluid whose pressure may be varied to increase/decrease the torsion-resistance of said tubular member.

54. A shock absorbing prosthesis according to Claim 46, further comprising a prosthetic foot secured to said lower support member.

55. An impact absorbing lower limb prosthesis, comprising:

an outer tube having a longitudinal interior, a proximal end and a distal end, said longitudinal interior having a polygonal cross-section along at least a section of its span, said distal end being attachable to a prosthetic foot, said outer tube housing a support within the interior of said outer tube;

an inner shaft having a proximal end, a distal end and a longitudinal cavity, said proximal end being attachable to a socket for receiving a stump of an amputee, said inner shaft having a polygonal outer cross-section that is closely enveloped by at least a portion of said section of said longitudinal interior of said outer tube, said inner shaft being mounted to move axially with respect to said outer tube; and

a coil spring having an upper portion residing in said longitudinal cavity of said inner shaft and an upper end fixed in position relative to said inner shaft,

said coil spring having a lower end attached such that said lower end is fixed in position relative to said outer tube, said coil spring capable of a smooth response to loading and unloading via compression and extension, said compression and extension of said coil spring controlling relative motion between said outer tube and said inner shaft;

whereby, the loading/unloading characteristics of said prosthesis to vertical compressive loads may be adjusted according to the particular weight of said amputee by selectively varying the spring characteristics of said coil spring.

56. The lower limb prosthesis of Claim 55, wherein said section of said longitudinal interior of said outer tube has a hexagonal cross-section.

57. The lower limb prosthesis of Claim 55, wherein said outer tube has a circular outer cross-section.

58. The lower limb prosthesis of Claim 55, wherein said support is fitted within said outer tube so as to provide a support means for said lower end of said coil spring.

59. The lower limb prosthesis of Claim 55, wherein said outer tube and said support are fabricated from a graphite/epoxy composite.

60. The lower limb prosthesis of Claim 55, wherein at least a portion of said section of said longitudinal interior of said outer tube is fitted with slide surfaces.

61. The lower limb prosthesis of Claim 60, wherein said slide surfaces are fabricated from RULON 142 bearing tape.

62. The lower limb prosthesis of Claim 55, wherein said outer tube has a length that is adjustable by the user.

63. The lower limb prosthesis of Claim 55, wherein communicating surfaces of said outer tube and said inner shaft have substantially mating polygonal cross-sections configured to prevent any relative rotational movement between said outer tube and said inner shaft.

64. The lower limb prosthesis of Claim 55, wherein said inner shaft has a hexagonal outer cross-section.

65. The lower limb prosthesis of Claim 55, wherein said longitudinal cavity of said inner shaft has a circular cross-section.

66. The lower limb prosthesis of Claim 55, wherein said inner shaft is fabricated from a light-weight metal.

67. The lower limb prosthesis of Claim 55, wherein at least one outer surface of said inner shaft is coated with a friction reducing coating to facilitate the relative sliding motion between said outer tube and said inner shaft with minimal friction and wear.

68. The lower limb prosthesis of Claim 55, wherein said upper end of said spring is adhesively bonded to an upper spring end fitting and said lower end of said spring is adhesively bonded to a lower spring end fitting.

69. The lower limb prosthesis of Claim 55, wherein said coil spring is interchangeable depending on the weight of the amputee.

70. The lower limb prosthesis of Claim 55, wherein said coil spring is fabricated from a chrome-vanadium steel wire.

71. The lower limb prosthesis of Claim 55, wherein said coil spring is constructed of wire which has a rectangular cross-section with rounded corners.

72. The lower limb prosthesis of Claim 55, wherein said coil spring is constructed of wire which has a "D" cross-section.

73. The lower limb prosthesis of Claim 55, wherein said coil spring is free of pre-loading stress, so as to provide a smooth or non-jarring compression initiation and a smooth or non-jarring extension termination.

74. The lower limb prosthesis of Claim 55, wherein said coil spring exhibits a displacement substantially linearly proportional to the applied force.

75. The lower limb prosthesis of Claim 55, wherein said coil spring has a maximum displacement of about one inch.

76. The lower limb prosthesis of Claim 55, wherein said distal end of said outer tube accommodates a replaceable resilient grease seal and a seal housing for substantially restricting wastage of grease and contamination of said coil spring.

77. The lower limb prosthesis of Claim 76, wherein said seal is fabricated from urethane.

78. The lower limb prosthesis of Claim 76, wherein said seal is fabricated from teflon.

79. The lower limb prosthesis of Claim 76, wherein said seal housing comprises a cap and ring assembly.

80. The lower limb prosthesis of Claim 79, wherein said cap and said ring are fabricated from aluminum.

81. The lower limb prosthesis of Claim 79, wherein said ring is adhesively bonded to said proximal end of said outer tube.

82. The lower limb prosthesis of Claim 55, further comprising:

an air-tight space enclosing a compressible fluid acting in combination with said coil spring to provide a smooth response to loading and unloading of said prosthesis; and

a valve in fluid communication with said air-tight space, permitting the pressure of said fluid to be varied.

83. The lower limb prosthesis of Claim 82, further comprising a pump for varying the pressure of said fluid.

84. The lower limb prosthesis of Claim 55, further comprising a flexible tubular member secured between said outer tube and said inner shaft, said tubular member preventing atmospheric debris from entering said outer tube or said inner shaft.

85. An impact absorbing lower limb prosthesis, comprising:

an outer tube;

an inner shaft having a hollow interior, said inner shaft reciprocatingly interfitted with said outer tube; and

resilient means operatively attached or disposed between said outer tube and said inner shaft, said resilient means being provided by an internal coil spring, said coil spring being free of pre-loading stress so as to provide a smooth or non-jarring compression initiation and a smooth or non-jarring extension termination; whereby

said prosthesis simulates a shock absorber when subjected to vertical compressive loads.

86. The lower limb prosthesis of Claim 85, wherein said coil spring has a maximum displacement of about one inch.

87. The lower limb prosthesis of Claim 85, wherein communicating surfaces of said outer tube and said inner shaft have substantially mating polygonal cross-

sections configured to prevent any relative rotational movement between said outer tube and said inner shaft.